The Impact of Depression on Medicare Inpatient Spending, Utilization, and Patient Cost Burden

By: Ashley Aviles Brizuela

Agenda

Study Background

Depression Among Older Adults

- Rates of major depression among older adults are substantially higher in particular subsets of the older adult population, including medical outpatients (5-10%, though estimates vary widely), medical inpatients (10-12%), and residents of long term care facilities (14-42%)

Depression and Health

- Physical health problems, functional disability, and chronic pain can make an older adult more susceptible to developing depression.
- Untreated depression can also increase the risk of developing various physical disorders, including heart attacks, and can complicate recovery from physical disorders, when left untreated.

Depression and Healthcare

- Himelhoch et al. (2004): Depressive syndrome and chronic conditions among Medicare beneficiaries, older, white, and female beneficiaries were more likely to use medical inpatient hospital services as compared with those without depressive syndrome. Additionally, those with depressive syndrome and at least one other chronic condition, increased the odds of using healthcare services altogether.

02

Research Questions and Hypothesis

Goal: Exploratory analysis of depression's effects on Medicare beneficiaries' health expenditure and Medicare spending on inpatient claims.

Research Questions

- Will Medicare beneficiaries with a diagnosis of depression have more costly inpatient claims?
- Will they utilize inpatient care more readily than their counterparts without depression?
- What is the prevalence of other chronic conditions among individuals with depression?
- Does spending and utilization differ for individuals with only depression versus those with depression and other chronic conditions?

Hypotheses

- Medicare beneficiaries with depression will be associated with higher medicare inpatient claim payments than their counterparts without depression.
- Medicare beneficiaries with depression will be associated with higher days spent inpatient than their counterparts without depression.
- Medicare beneficiaries with depression will be associated with higher personal healthcare costs.

Research Methods

Data Utilized

- 2008–2010 Medicare Data Entrepreneurs' Synthetic Public Use File (DE-SynPUF)
- Beneficiary Summary DE-SynPUF file with 112,754 synthesized beneficiary records and with 32 variables
- Medicare Inpatient Claims SynPUF data containing 66,773 beneficiary claims with 81 variables
- **Final data set composed of both above:** 66,773 beneficiary records with 124 total variables

Variable Creation

- **Medicare Pay:** (inpatient claim payment amount) + (claim pass through per diem amount * claim utilized inpatient days)
- **Person Cost:** (inpatient deductible) + (coinsurance liability amount) + (blood deductible liability amount)
- **Chronic Condition Count** from original 11 chronic condition flags
- **Separated Race Variables** from original

Software Utilized

- Data Wrangling: R
- Table creation: Tableau
- Statistical Analysis: R

Statistical Analysis

- Linear Regression
- Multivariate Regression
- Both with a P value standard of 0.05.

Results

Key Takeaways: There was no discernable difference in Medicare spending between beneficiaries with depression versus those without. Depression among Medicare Beneficiaries was associated with less medicare spending on inpatient claims. Other Chronic conditions were associated with increased medicare spending. Our hypotheses all failed to reject the null.

Demographics

- Sample size: n = 64,914
- Sex: Male (43%), Female (57%)
- Majority white (84%)
- High Chronic disease prevalence
- 97% of beneficiaires with depression have at least one chronic condition

Medicare Inpatient Spending

Exhibit 2. Inpatient healthcare expenditure, utlization, and cost: Medicare and Beneficiaries, 2008-2010

	Medicare Expenditure						
	Total Medicare Spend			Average Spend			
Members:	2008	2009	2010	2008	2009	2010	
With Depression	$ 85,040,770	$ 76,375,280	$ 46,283,620	$ 9,074	$ 9,680	$ 9,535	
Without Depression	$ 166,639,760	$ 172,293,740	$ 93,626,720	$ 9,524	$ 10,028	$ 10,343	
With Depression only	$ 2,379,460	$ 3,788,740	$ 996,670	$ 8,912	$ 9,970	$ 9,143	
With Depression & Other Chronic Conditions	$ 82,661,310	$ 72,586,540	$ 45,286,950	$ 9,079	$ 9,665	$ 9,544	
Depression and Chronic Conditions							
+1	$ 5,690,120	$ 8,141,790	$ 2,344,320	$ 8,430	$ 10,241	$ 8,343	
+2	$ 11,567,650	$ 11,385,620	$ 5,316,580	$ 9,166	$ 9,568	$ 9,042	
+3	$ 14,125,020	$ 13,633,920	$ 7,805,180	$ 8,839	$ 9,548	$ 9,577	
+4	$ 15,844,120	$ 13,466,590	$ 9,572,780	$ 8,957	$ 9,268	$ 9,544	
+5	$ 15,698,630	$ 12,082,680	$ 8,494,550	$ 9,367	$ 9,994	$ 9,544	
+6	$ 10,754,740	$ 8,014,770	$ 6,401,890	$ 9,083	$ 9,656	$ 9,656	
+7	$ 6,402,460	$ 4,145,190	$ 3,921,090	$ 9,570	$ 9,315	$ 10,832	
+8	$ 1,949,870	$ 1,438,130	$ 1,103,260	$ 9,112	$ 11,063	$ 9,763	
+ 9 or more	$ 628,700	$ 277,850	$ 327,300	$ 8,024	$ 12,002	$ 14,819	

Linear Regressions

Exhibit 3. The relationship between Medicare Payments, Person Cost, and Inpatient days and diagnosis of Depression

	Model 1		Model 2		Model 3	
	Coefficient		Coefficient		Coefficient	
Constant						
Medicare Pay	9891.61	(45.12) ***				
Person Cost			1145.89	(4.81) ***		
Inpatient Days (Utilization)					5.46	(0.03) ***
Independent Variables						
Depression	-500.24	(77.86) ***	-4.06	(8.30)	0.37	(0.05) ***
R-squared		0.00		0.00		0.00
No. Observations		65,846		63,772		65,846

Standard errors are reported in parantheses
Significance Levels: * p<0.05, ** p<0.01, *** p<0.001
Source: Authors' analysis of pooled 2008–2010 Medicare Data Entrepreneurs' Synthetic Public Use File (DE-SynPUF) Data
Notes: Spending variables for Medicare and Beneficiaires were calculated using variables from CMS Inpatient Claims DE-SynPUF ONLY.

Multivariate Analyses

Exhibit 4. Multivariate regressions for Medicare Payments and Person Cost between key variables of interest

	Model 3		Model 4	
	Coefficient		Coefficient	
Constant				
Medicare Pay	9846.04	(275.61) ***		
Person Cost			1179.35	(29.35) ***
Independent Variables				
Depression	-498.17	(87.67) ***	3.38	(9.37)
Alzheimer	-434.79	(88.43) ***	1.38	(9.45)
Congestive Heart Failure	162.84	(92.44)	8.11	(9.86)
Cancer	419.1	(126.89) ***	-5.97	(13.56)
Chronic Kidney Disease	926.92	(89.53) ***	28.81	(9.57) **
Chronic Obstructive Pulmonary Disease	-429.6	(94.94) ***	26.95	(10.14) **
Diabetes	-98.83	(95.03)	14.95	(10.13)
Ischemic Heart Disease	84.82	(97.07)	2.68	(10.33)
Osteoporosis	-198.79	(97.35) *	-4.11	(10.39)
Rheumatoid Arthritis and Osteoarthritis	-94.01	(104.79)	-14.83	(11.17)
Stroke/Transient Ischemic Attack	202.75	(148.29)	28.74	(15.90)
Sex	97.41	(74.13)	5.93	(7.91)
White Member	-140.73	(266.22)	-44.21	(28.36)
Black Member	-302.12	(286.60)	-60.13	(30.54) *
Other Member	-80.95	(335.15)	-39.27	35.76
Hispanic Member	NA	NA	NA	NA
Chronic Conditions = 2	-40.7	(143.11)	-0.52	(15.24)
Chronic Conditions = 3	-55.3	(163.57)	-0.4	(17.45)
Chronic Conditions 4+	9.53	(221.77)	-46.33	(23.70)
R-squared		0.00		0.00
No. Observations		65,846		63,772

Standard errors are reported in parantheses
Significance Levels: * p<0.05, ** p<0.01, *** p<0.001

05

Conclusion and Next Steps

Conclusion

- The analysis was consistent with the literature demonstrating a higher prevalence of chronic conditions among those suffering from depression.
- The regression analysis showed conflicting evidence with the literature of less spending among Medicare beneficiaries with depression.
- There was also no discernable difference between beneficiaries with depression versus those without in healthcare cost.
- The conflicting results with the literature can be due to a variety of factors considering the complexity of depression on social and medical factors and the complexity of older patient populations.

Next Steps

- Utilize a bigger sample size of CMS SynPUF Medicare beneficiaries.
- Add Outpatient claims and Prescription drug events claims
- Investigate the differences of beneficiaries with depression versus those without within the newly added outpatient and prescription drug claims.

Thank you.